IMPERIAL

DEPARTMENT OF AGRICULTURE

FOR THE WEST INDIES

IMPERIAL BUREAU
3 MAY 1930
OF MYCOLOGY

REPORT

ON THE

AGRICULTURAL DEPARTMENT

ANTIGUA.

1928-29.

ISSUED BY THE IMPERIAL COMMISSIONER OF AGRICULTURE

FOR THE WEST INDIES.

1930.

[Price Sixpence.]

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LETTER OF TRANSMITTAL.

COPY.
C.A. 818.

TRINIDAD,

10th December, 1929.

Sir,

I have the honour to transmit herewith the report on the working of the Agricultural Department, Antigua, for the year ended March 31st, 1929.

2. The report refers to the usual routine work of the Department in the nurseries and in connection with various ornamental plots in public institutions and public places.

3. Nursery work is greatly interfered with by lack of water during drought and it is noted that during the long extended dry period in 1928, trials with sugar cane seedlings and other seedlings suffered badly for want of water.

4. Reference is made to the effects of the hurricane storm in September, 1928.

5. The discovery of gumming disease of sugar cane in Antigua early in 1929 caused great anxiety in the island. Notes on this disease prepared by Mr. Ashby who investigated the outbreak are printed in the report. It may be added that while the occurrence of this disease is causing anxiety, up to the present time no serious losses have been recorded as being due to its occurrence in the sugar cane of the island.

6. The rainfall in Antigua was very deficient up to the time of the hurricane in September, after that for the remainder of the year there was a considerable improvement, and the sugar cane crop which had been very backward made good progress under the influence of better rainfall conditions.

I have the honour to be,

Sir,

Your most obedient servant,

(Signed) H. A. BALLOU,

Commisioner of Agriculture,
Imperial College of Tropical Agriculture.

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REPORT ON THE AGRICULTURAL DEPARTMENT, ANTIGUA.

FOR THE PERIOD APRIL 1928 TO MARCH 1929.

STAFF OF THE AGRICULTURAL DEPARTMENT 1928-29.

Agricultural Superintendent.	A. W. Gallwey.
„ „ (acting) Jan 2 1929—Ap. 39. 1929.	J. L. Illingworth, M.A.
„ „ Assistant. Up to May 16 1928.	J. H. Allen.
„ „ From May 17 1928.	H. St. J. S. Bell.
Assistant Clerk. April 1 1928—Sept. 30 1928.	J. F. Vanier.
„ „ 4 „ —June 4 „	W. L. Maguire.
„ „ June 5 1928—Jan. 31 1929.	S. H. Abbott.
„ „ From Nov. 5th 1928.	M. A. R. Potter.
„ „ From Sept. 16 1928.	R. H. Georges.
Cotton Inspector. April—June 1928.	H. St. J. S. Bell.

The interchange of officers still continues and has again handicapped the working of the Department, both in the office and field.

WORK IN THE BOTANIC GARDENS AND OBSERVATIONS ON PLANTS.

The rainfall experienced during this period was only 38.85 inches of which over 16 inches fell between September and November.

In consequence of these dry conditions many of the plant specimens in the station showed the effects of the drought throughout the greater part of the year.

From September, however, a marked change was observed in the vegetation in the garden through the beneficial rains accompanying a hurricane which passed south of this island on the 12th and after. This cyclonic disturbance had

two effects which were to be expected, viz (a) the revival of low-growing shrubs and plants from the drought and (b) the destruction of some of the taller specimens among which the following were lost:—Woman's tongue, (*Albizzia lebbek*); White Wood, (*Terminalia buceras*); *Eucalyptus rostrata* (two specimens); Royal Palm (*Oreodoxia regia*), (3 specimens); and several specimens of the Jamaica shade tree, (*Pithecolobium Saman*).

In addition considerable pruning work had to be performed.

The whole nursery stock of plants was severely damaged, necessitating a fresh start to be made in the raising of such plants as Crotons, (*Codiaenm*) etc.

In this connection the thanks of the Department are due to other Departments of Agriculture in the West Indies for a supply of pot plants.

The decorative beds and borders were maintained in good condition and presented a pleasing aspect to visitors to the garden.

WORK IN THE NURSERIES AND DISTRIBUTIONS OF PLANTS.

Another attempt was made to raise new varieties of sugar cane seedlings for the purpose of finding a cane which showed better field and milling characters than the leading varieties at present under estate cultivation. Owing to the small amount of rain experienced in June, the seedlings suffered severely as the watering of the garden beds had to be curtailed. In consequence, none of these seedlings made any progress.

It is a matter of impossibility to raise new canes without having the proper glass housing accommodation and ample supply of water.

A supply of seeds of The Tung Oil tree (*Aleurites Fordii*) was received from the U.S.A. at the instance of the Imperial Institute Committee for Oils and Oilseeds.

Over two hundred seedlings were raised but these did not do well under conditions prevailing at the Station. The young plants after having attained a height of 9-10 inches shed their leaves and failed to recover or make fresh growth.

Considerable time and attention were devoted to the raising of large quantities of *Casuarina, Eucaluptus*, and various decorative material for the purpose of planting up the newly made gardens at the various Government institutions.

Seeds of Black and Silver Wattle were received and sown during the period under review. These seeds germinated indifferently and only a small stock of plants was raised. Owing to the slow growth of seedlings no distributions were made. These seeds were imported to provide trees for estate pastures with the special view of encouraging a local export of tanning material.

In fulfilment of an order from one estate a large quantity of W.I. Lilac (*Malia sempervivens.*) was raised and a part of this order executed. Many of these plants were used for planting up decorative spots and gardens.

PLANT AND SEED DISTRIBUTION.

The following planting material was distributed during the period under report:—

Decorative	794
Casuarina	781
Coconut	3600
Lime	2924
Guava	314
Lilac	260
Eucalyptus	98
Pine-apple suckers	207
Onion Seedlings	6870
Sweet Potato Cuttings	205,500

SEEDS.

Vegetable	469 pkts.
Cotton	39 lb.
Onion	77 „

It is desired to place on record a word of appreciation and grateful thanks to Mr. T. B. Macaulay, President of the Sun Life Insurance Company of Canada who voluntarily donated the sum of £150 for the purchase of good seed-coconuts for distribution to peasants throughout the island. Four thousand nuts were imported from Nevis and were germinated at the Station. A percentage germination of 94% was obtained, and 3,600 plants were subsequently distributed to peasants. This generous gift will undoubtedly prove in the course of time of considerable utility to the recipients of plants in the various districts.

AGRICULTURAL EXPORTS.

The following table shows the agricultural products exported from the island during the year 1928.

Article.	Quantity		Value
Sugar (Grey Cristals)	18,906 tons		£245,780
Molasses (Vacum Pan)	529,800 gals		
„ (Syrup Muscovado)	43,500 „	Fancy Syrup	
Cottcn lint	17,700 lb.		£ 1,770
„ seed	45,850 „		£ 110
Lime juice (Raw)	840 gals		£ 42
„ „ (Concentrated)	2,350 „		£ 457
Lime oil	108 „		£ 1,215
Hides and Skins			£ 297
Tamarinds			£ 611
Hardwood			£ 60
Turtle Shell			£ 93

LIVE TOCK.

Horses	30	£ 300
Cattle	1	£ 10
Asses	20	£ 40
Dogs	68	£ 1.16
Sheep	2	£ 17
Swine		
Goats	2	£ 1.5

PLANT IMPORTATIONS.

The chief planting material imported during 1928-29 was a collection of canes from Trinidad. The varieties imported were P.O.J. 979 P.O.J. 2878, F.C. 436, B39 and B 409. These were given special attention by the Department to prevent the introduction of the Frog-hopper pest (*Monecphora* [Tomaspis] *Saccharina.*)

Other seed importations worthy of comment were:—

Shisham seed, (*Dalbergia Sissos*); Black Wattle (*Acacia decurrans*); Silver Wattle (*Accacia dealbata*); Talipot Palm (*Corypha umbraculifera*) and numerous palms from Barbuda and Trinidad for planting at Fort James.

In addition, numerous fruit trees and decorative material were brought to the island by private individuals.

PLOT EXPERIMENTS AT SKERRETTS EXPERIMENT STATION.

Selection work on the three strains of cotton under trial in 1927, viz. the Antigua, Montserrat and Barbados types, was not followed up in period under report, owing to staff changes. The Agricultural Superintendent having gone on leave of absence, his *locum tenens,* in collaboration with the Assistant Chemist thought it was prudent to make some new isolations in a field of the Heaton or Montserrat strain growing under estate conditions.

The three strains under cultivation, at the same time as the new selections were made were, however, kept separate but no plant-breeding work was done on these strains.

The yields of clean seed cotton obtained from these types were as follows:—

Montserrat	231 lbs.	or 7,392 lb. per acre.
Antigua	126 „	„ 4,032 „ „ „
Barbados	108 „	„ 3,456 „ „ „

Twelve new isolations were made in field No. 6 at Yeptons Estate.

The following table gives the results of field characters and subsequent laboratory examinations.

Table I. Field Characteristics.

election No.	Habit.	No. of Bolls.			Size and Shape of Bolls.	Distribution.	Wt. of Seed Long and Cotton	Calculated Yield. A Seed Cotton. B Lint.
		Picked.	Unpicked.	Total.				
221	Rather straggling 4-5 ft.	6	100	106	Fair size, pointed.	General.	135 gms.	A 143 gms. B 31.5 gms.
435	Compact 4 ft.	8	78	86	„	„	163 gms.	A 180 gms. B 57.5 gms.
453	Straggling 4 ft.	4	68	72		„	137 gms.	A 145 gms. B 44.5 gms.
173	Rather straggling 4 ft.	..	101	101	Large and pointed.	„	88 gms.	A 88 gms. B 18.5 gms.
160	Conical. compact. 3 ft.	7	93	100	Long and pointed.	Basal.	142 gms.	A 153 gms. B 48 gms.
147	Straggling 4 ft.	4	93	97	..	„	97 gms.	A 101 gms. B 33.2 gms.
424	Straggling 4 ft.	3	117	120	Large, long pointed.	„	182 gms.	A 186 gms. B 48 gms
40	Conical compact 3½ ft.	53	53	106	..	„	57 gms.	A 114 gms. B 36.2 gms.
472	Conical compact 4 ft.	14	77	91	..	„	133 gms.	A 157 gms. B 56.2 gms.
329	Conical compact 3½ ft.	3	78	81	Very large.	„	125 gms.	A 131 gms. B 42.1 gms.
88	Conical compact 4 ft.	..	114	114	Large and pointed.	„	167 gms.	A 167 gms. B 49.3 gms.
470	Compact 3 ft.	10	88	98	„	General.	130 gms.	A 146 gms. B 46.7 gms.

Table II. Laboratory Examination.

Lint Lengths. m. m.	Average lint length. m. m.	Wt. of 100 Seeds. gms.	Lint Index gms.	Ginning output. Percentage. A. on 100 seeds.	Ginning output. Percentage. B. on whole sample.	Remarks.
50.48.49.48.49.	48.8	10.330	2.89	22	22.4	Poor.
51.50.50.50.51.	50.4	11.26	5.30	32	30.8	
51.51.51.52.52.	51.4	12.97	5.74	30.7	32.0	Good.
51.52.50.50.50.	50.6	10.98	2.82	21.0	23.8	
51.50.50.50.50.	50.2	12.92	5.92	31.4	32.8	
52.52.51.51.50.	51.2	12.69	6.18	32.8	33.7	Good.
53.53.54.54.53.	53.4	12.40	4.32	25.8	28.2	Fine.
50.51.50.51.50.	50.4	11.27	5.26	31.8	32.0	Rather weak.
50.51.51.49.50.	50.2	10.78	6.00	35.8	28.4	Good.
52.52.53.52.52.	52.2	12.19	5.76	32.1	32.5	Good.
49.51.51.51.50.	50.4	12.90	5.40	29.5	25.5	Rather weak.
50.50.51.51.50.	50.4	11.92	5.69	31.0	32.0	

YAMS.

Ten varieties of Yams were again under experimentation during the year.

The following table gives the yields obtained:—

Variety.	Calculated yield per acre in lb.
Crop	9,728
Bottle-necked Lisbon	9,216
Light Red	6,460
Oriental	5,632
Cush-Cush	2,550
Lisbon	1,864
Sealed Top	1,360
Buglehorn	1,280
Danish	906
Cush	815

The yields in this season were very poor which may be attributable to paucity of rainfall after planting time.

EDDOES AND TANNIAS.

Six varieties of Eddoes and Tannias were under cultivation this year.

The following table gives the yields obtained:—

Variety.	Calculated yield per acre in lb.
Tannia Roliza White	678
Tannia Priete	1921
Tannia Eddoes	1700
Tannia White	2720
Tannia Yellow	3468
Tannia Roliza	3135

SWEET POTATOES.

In order to stimulate interest in the production of a type of sweet potato which would find favour in the Canadian Market a hamper of the variety known as the New Jersey Potato was obtained from Canada as a nucleus.

From a plot planted at Skerrett's in this potato, a calculated yield per acre of 16,000 lb was obtained.

The variety of potato is one of the yellow-skinned types which when cooked resembles a pumpkin in colour and taste.

Several plots have been replanted in this type of potato for supplying estates and peasants with cuttings.

Quite a number of planters availed themselves of the opportunity of establishing small areas of this type of potato from the nucleus imported from Canada.

PINE-APPLES.

Two plots were maintained under pine-apples of the Antigua black variety. From time to time suckers were taken from these plants and distributed to planters and peasants.

No insect or fungus diseases attacked this crop during the year.

BEANS.

Plots were planted with Vilmorins stringless bonavist and Barbuda beans. These grew well and were cut back and buried as green dressings.

CLOVER.

An attempt was made to establish the red and white varieties of Clover.

Germination was good but the plants grew very poorly and yielded only 128 lb. of dried seed to the acre.

Heavy clayey soil does not appear suitable to the growing of this crop.

EXPERIMENTS WITH TOMATOES AND CUCUMBERS CONDUCTED IN ANTIGUA DURING THE SEASON 1928-29.

In January 1928 a Conference was held in Barbados and Trinidad at the instigation of the late Captain Cook—Special Representative of the Canadian National Steamship in the West Indies—with a view to encouraging the development of an export trade in fruit and vegetables between these islands and the Dominion. As a result of this Conference it was decided to determine the economic feasibility of growing tomatoes and cucumbers in Antigua for the Canadian market and a scheme was put forward for growing plots of these vegetables in certain of the better watered districts of the island.

Unfortunately the original plan which called for four experimental plots two under the direct control of the Agricultural Department, and two on estates was abandoned as being rather expensive—the cost of effective supervision being too high and it was decided to plant only two plots both on estates—the proprietors attending to and paying for cultivation with Government guarantees against loss through failure of crops.

Two plots of tomatoes were grown—one of two-fifths of an acre, and one of one-half of an acre at Claremont. A plot of cucumbers two-thirds of an acre in area was also cultivated at Claremont.

The varieties of tomatoes grown were Stone and Beefsteak and of Cucumbers, Early White Spine. The plots were planted late in November, in December and early in January, the crops being reaped during the months of February to April.

The best yield of tomatoes was from the plot of Stone planted at Cooks Estate which gave a yield at the rate of 4,000 lb. per acre of marketable fruit. Beefsteak on the same estate yielded only at the rate of 4,000 lb. marketable fruit—and many of these were of too irregular a shape for shipment. Stone is also better suited for the Canadian market.

No record was kept of the yields of the two varieties at Claremont, as an accident occurred to the motor lorry which was carrying the seedlings from the Botanic Station in St. John's to the field, resulting in the seedlings which were saved becoming badly mixed. The yield however appeared to have been somewhat lower than at Cooks.

The cucumber plot at Claremont yielded well—840 fruit of marketable size weighing approximately 777 lb., equivalent to 4,200 fruit weighing 3,885 lb. per acre.

All the tomatoes and cucumbers exported were sent by the growers to the Government Laboratory where they were selected, graded and packed. It

should be noted that a number of tomatoes were rejected owing to injuries received during picking an dtransportation to St. John's. Careful attention will have to be given to this point in future experiments.

Unfortunately a large percentage both of the tomatoes and of the cucumbers matured at a time when there was no shipping opportunity and had to be disposed of locally in a market which very quickly became glutted. The provision of local cool storage which would allow fruit to be picked at the right stage and stored until shipment is an absolute necessity if a fruit and vegetable trade is successfully to be established.

Tomatoes were shipped to two firms in Canada—the Goodwin Co. of St. John N.B. and Empire Products also of St. John. Cucumbers were shipped to both of these firms and also to St. Arnaud et Fils of Montreal.

Both kinds of fruit were shipped in cool storage at 55° to 60°F.

A small profit was realised on the first shipments of tomatoes and cucumbers although the former were purchased from the growers at 4d. per lb. and the latter at 2d. each.

Losses were experienced on all subsequent shipments although fair prices were obtained in Canada for all the tomatoes exported, the losses being due to high freights and to the use of unsuitable and expensive packages. In the case of those shipments of cucumbers on which there were losses these were due to shipping fruit which proved too ripe for the market—a mistake which should never be repeated.

The best price realised in Canada for tomatoes was 11½d. per lb—leaving 6½d. per lb. to the grower after paying all expenses of shipping, packing etc.

Other prices realised were 6.8d. per lb. and 5d. per lb. allowing the grower 2.1d. and 1d. per lb. respectively.

The best price obtained for cucumbers was 6¾d. each equivalent to 3½d. each to the grower.

An attempt was made to dispose of tomatoes which ripened at a time when they could not be sent to Canada, by shipping to Barbados. A price of 5d. per lb. was obtained allowing just over 2d. per lb. to the grower.

While the experiments were not financially a success—a net loss of £13 5s. 3½d being realised—they have indicated that very fair prices can be obtained in Canada and fair yields secured under favourable conditions. Freight and packages have been too expensive. The former has now been reduced from 60 cents to 40 cents per cubic foot and cheaper and more suitable packages can also be obtained. It is therefore hoped to continue these experiments during the coming year—provision being made for local cool storage and for starting the experiments at a sufficiently early date to permit marketing in January or February when prices are at their highest.

At the present time when production is only on a very small scale prospective shippers are advised to export chiefly or entirely to firms in New Brunswick as in this way they save the extra charges for rail transport which would be involved in shipping to Montreal or Toronto.

WORK IN CONNECTION WITH INSECTS AND FUNGUS PESTS AND THEIR CONTROL.

MOSAIC DISEASE OF THE SUGAR CANE.

During the period under report only one case of suspicious mosaic disease was observed.

This suspected seedling was in a field of canes on Cassada Garden Estate, the cuttings of which were imported from Barbados. The variety is B417.

Upon close inspection of the seedling by the Superintendent of Agriculture and the Agricultural Superintendent it was definitely decided that the specimen exhibited leaves of a new sport and shewed no signs of the disease. The seedling subsequently assumed a normal growth and colour of leaves and developed a normal root-system.

GUMMING DISEASE OF SUGAR CANE.

The following resumé on gumming disease was prepared by Prof. F. S. Ashby, Mycologist, Imperial Bureau of Mycology for the benefit of the local Officers of the Department.

Distribution.

"The disease was detected for the first time in the British West Indies in St. Kitts towards the end of 1925. It has been found since in St. Lucia, Antigua, and Dominica, search in the present year failed to detect it in Barbados and Trinidad."

"Outside British territory it was reported for the first time from Porto Rico in 1920 and from Colombia in 1926. It was detected in Guadeloupe early in the present year. St. Lucia is the most southerly island in which it has been found, but it has probably not been looked for in Montserrat, St. Vincent and Grenada nor in British Guiana."

Cause and Symptoms.

"Gumming Disease is caused by a bacterium (B. Vascularum Cobb) (G. S.m.) which multiplies in the vascular bundles of the leaves and stems. It causes failure of seedpieces to sprout, early death of young shoots, stunting and dying out of older stools and lessened ratooning power; affected canes may deteriorate rapidly after cutting and the presence of gum in the juice may seriously reduce or delay crystallization in the factory.

D. S. North's observations in Australia indicate that the bacterium is a wound parasite which may be spread rapidly from leaf to leaf by wind and driving rain; it is also transmitted in the seed-pieces taken from infected stalks. Although definite data seem to be lacking at present it is very probable that, as in the case of Scald Disease, infection is transmitted from diseased to healthy cuttings by the knife of the trimmer, and in the field from diseased to healthy stools by implements. Infection is not retained in nor transmitted by the soil. The infection may remain restricted to the leaves and leaf sheaths, showing as characteristic, pale, translucent stripes ending in broader dead stripes (a good coloured figure, plate 1 in Bull 2. Div. of Pathology Bureau of Sugar Experiment Stations Queensland, 1929.) The disease may be regarded as primarily a leaf disease apparently causing little injury in that form but liable to run down into the stalks and cause loss dependent on the degree of the vascular occupation. It would appear that all cultivated varieties can become to some extent infected in the leaves but may differ greatly in power to restrict multiplication of the pathogen in the leaves and in the stems."

The position in the island is roughly the following:—

"I found a total infection of the leaves of plants and ratoons of B.11569 at two estates in January of the present year. A survey carried out by the Federal and the Island Departments of Agriculture in February, showed this variety to be completely infected in the leaves throughout the island. Other varieties showed slight leaf infection when growing in contact with B.11569.

"On my return, early in March, gum was found in the leaf sheaths but rarely in the stems of that variety. In January, 1926 after a visit to St. Kitts, I examined the cane varieties at Skerrett's Experiment Station, but detected no signs of the disease and infer, therefore, that infection has increased greatly during the last three years. It is probable in view of North's findings, that the storm of September, 1928, was responsible for a considerable increase in the amount of leaf infection on B.11569 and, to a lesser degree, on other kinds. About one-tenth of the total area in the island is now planted in this variety, which has become a favourite cane for late planting, and supplying; and the area under it has been rapidly increasing during the last three years. The actual area under it is greater than that mentioned, as it has been used freely for supplying gaps in fields planted with other kinds. Owing to the leaf infection on this cane, it has not been possible to determine the reduction in tonnage, if any, due to this form of the disease on this year's crop. The two central factories, Gunthorpes and Bendals, have not reported any difficulties due to gum in the juice in recent crops. As a consequence of my observations on B. 11569 and the complete leaf infection in Antigua, I advised the planters, at a representative meeting early in March, to cease planting it and all agreed to do so. The planting season was already over and as it was customary to take at least three ratoon crops, the elimination of the variety, if the planters hold to their intentions, will not be complete under four or five years. Subsequent to my visit Messrs. Illingworth and Warneford have found an appreciable but light stem infection (oozing of gum) in the mature plant cane of B. 11569 but very little in the ratoons. This infection is very probably due to passage of the bacteria into the stems from the infected leaves. It is probably not sufficient in intensity to cause appreciable difficulties in manufacture during the present crop. The total infection of the leaves, gumming of the leaf sheaths, and the presence of gum in a portion of the stems will certainly have resulted in the planting of an appreciable number of infected cuttings of B. 11569 late in 1928 and early in the present year. It would be desirable to watch the effect of this cutting infection on the growing crop, especially after the rains begin (from May onwards) and active growth is in progress. It is also desirable to examine the effect on the following young ratoon growth of the complete leaf infections of the mature plant and ratoon cane now being reaped. Observations made this year are likely to give useful indications of the degree of resistance of this variety to the disease on three soil types (limestone, volcanic and heavy clay) under the climatic conditions of Antigua. The danger of breakdown in this cane under this disease is potential, and there is no evidence yet that perceptible losses have been experienced. It is believed, however, that the decision to stop further planting of this variety, which was rapidly tending to become the dominant kind, was prudent. Antigua is fortunate in having a considerable number of other varieties of proved value under the local conditions, most of which appear to be resistant in a marked degree to Gumming Disease. Ba. 6032 passed out of favour some years ago and is now rarely grown. The most widely grown kind B.H. 10(12) happens to be one of the most resistant to Gumming Disease. In addition to B. 11569 the behaviour of S.C. 12/4 and B. 6308 both under a large acreage, needs to be carefully watched this year.

Control.

The measures to be adopted at present have been indicated. First is the cessation of planting of any variety showing any signs of marked susceptibility. The Transparent canes are the only kinds, other than B. 11569 now

under cultivation which show definitely such susceptibility. More drastic measures do not appear to be called for unless one or other variety develops an injurious amount of gumming in the stems. Should B. 11569 show this condition in the crop of 1930 it might be desirable to curtail the ratoons and endeavour to eliminate it from cultivation as quickly as possible. Experience in Australia and Porto Rico has shown, however, that ratoons may be very much less infected than plant cane. (See Gummosis of Sugar Cane by M. T. Cook; Journ. Depart of Agriculture, Porto Rico, xii, No. 3 July 1928 issued February 1929.)

Recommendations.

It is desirable that the behaviour of the disease on the growing crop of all varieties, but especially of B. 11569 in Antigua during the rainy season this year be carefully studied by an officer who has already had experience of it. I have therefore recommended to the Commissioner of Agriculture for the West Indies, that Mr. Illingworth who has, in conjunction with Mr. Warneford, been working on the disease since January, be seconded to the Leeward Islands Department of Agriculture as Special Assistant for Sugar Cane Disease, for a period of six months, in order to continue and extend his investigations. His return to the Virgin Islands as Agricultural Superintendent when Mr. Gallwey returns to Antigua from leave in April, would cause a break in the continuity of this work on the disease, since Mr. Warneford, the Assistant Chemist, could not alone give the necessary attention to field observations and experiments.

PARASITIC CONTROL OF THE MOTH BORER.

During the reaping season of 1928-29 further examinations were made of fields, in which Iprobracon parasites had been liberated. In the previous report on this Station the results obtained up to March 1928 were given.

The following table shows the results of examinations of the various estates fields, the plants of which were reported to be attacked by Moth Borer (Diatraea Saccharil).

Estate.	Field.	No. of Canes.	Variety.	% attacked.	
Elliots	No. 6	100	B.4596	8.1	
Collins	8	100	S.C. 12/4	3.0	Approximating 10% General Infection with a range of 2.1-14.4.
Millars	7	100	S.C. 12/4	12.1	
Blubber Valley	2	100	B.6308	14.4	
The Cotton	5	100	B.4596	2.1	

In addition, the young sprouts in fields at two additional estates, in which parasites had been liberated, were examined, but no borer-infested stools were found.

No further supplies of these parasites could be obtained from British Guiana.

No conclusions can be arrived at with regard to the reduction in the percentage borer infestation.

PINK BOLL WORM INVESTIGATION.

Trials to ascertain the time when emergence of the Pink boll worm moth is at its maximum were again made.

No accurate data could be ascertained in the period under review as the hurricane of September 12, 1928, overturned the cage and destroyed the cotton plants. It is however proposed to follow up this investigation in 1929.

SUMMARY OF LEGISLATION AFFECTING ANIMALS, PLANTS, CROPS, ETC.

Swine Epidemic Act 3 *of* 1893. Gives extended power to Board of Health for the prevention of the spread of disease among animals.

City of St. John's By-law 13 *of* 1899. City by-law for the purpose of dealing with cattle disease.

Ordinance 7 *of* 1913. An ordinance to prohibit the introduction of Mongoose into Barbuda.

Diseases of Animals Ordinance 16 *of* 1913. Repeals and amends the law relating to contagious dieases among animals. Animals and diseases clearly defined. Inspectors empowered to visit and inspect estate premises etc. for diseased animals and to ensure that provisions are carried out. Suspected animals to be examined by Veterinary Surgeon and on his (positive) report shall be slaughtered.

Diseases of Animals (Amendment) Ordinance 8 *of* 1920. An Ordinance to amend further the Diseases of Animals Ordinance 16 of 1913. States that the Governor may by Order-in-Council revoke, amend or vary any Order-in-Council issued under the provisions of this section.

Order-in-Council dated 22nd May, 1924 under section 18 of the Diseases of Animals Ordinance 1913 prohibits the importation of all foreign animals when brought from the United Kingdom on account of FOOT AND MOUTH DISEASE.

Statutory Rules and Orders 17 *of* 1929 *Amendment of Order-in-Council* dated 22nd May 1924, under section 18 of the Diseases of Animals Ordinance 1913 (Antigua No. 16 of 1913) provides that cattle, sheep, pigs and goats will be allowed to be imported into Antigua provided that such animals have been detained and isolated under official veterinary supervision for a period of at least 14 days immediately before shipment at the Quarantine Station situated at the East India Dock, London.

PLANTS.

Plant Fumigation Ordinance 5 *of* 1905. To provide for the fumigation of plants imported into the Presidency.

Plant Protection Ordinance 16 *of* 1923. An ordinance for the prevention and eradication of diseases and pests affecting vegetation.

Proclamation of 5th October 1928 *under Plant Protection Ordinance* 16 *of* 1923 prohibits the importation except under license to be granted by the Governor of SUGAR CANE and parts of SUGAR CANE from ALL PLACES, BANANA PLANTS AND PARTS OF BANANA PLANTS including their fruits from British Guiana, Dutch Guiana, Central America or any island or place in the WEST INDIES EXCEPT Barbados and the other islands of the

Leeward Islands Colony, ROOTED PLANTS OF THE CIRTUS FAMILY from the United States of America, Jamaica, Cuba, Haiti and Santo Domingo, UNLESS accompanied by a certificate signed by a responsible inspecting officer stating that the district from which such plants originate has not been affected by or has been free for the preceding two years of CITRUS CANKER, LIME PLANTS AND PARTS OF LIME PLANTS including their fruits from British Guiana, Trinidad, Dominica, St. Lucia and St. Kitts; COTTON SEED AND SEED COTTON and all packages, coverings, bags or any articles of things which have been used as packages, etc. or any COTTON SEED, LINT, COTTON, OR SEED COTON from all places EXCEPT small quantities of seed specially imported by the Agricultural Superintendent with the approval of the Governor. SPROUTED COCONUTS from Grenada, Trinidad and St. Vincent. (Proclamation in force for one year from above date.)

AGRICULTURAL PRODUCTS.

The Produce Ordinance 20 *of* 1922. All growers and sellers of produce to be licensed. Produce means cacao, maize, coconuts, limes and wood, the growth, produce or manufacture of the Presidency of Antigua.

Order-in-Council of 13*th November*, 1922 adds pineapples and onions to Produce Protection Ordinance 20 of 1922.

The Export Duty Continuance Ordinance 1927 *No* 24 *of* 1927 states that Exports Duty Ordinance 1927 shall continue in force for one year till 31st December, 1928.

Statutory Rules and Orders No. 11 *of* 1928 *Order-in-Council dated April* 16, 1928 under Produce Protection Ordinance 20 of 1922 adding tamarinds to the list of protected produce.

Ordinance 16 *of* 1929. *Produce Protection Amendment Ordinance* 1929. The payment of 2s. for a sellers license is no longer necessary.

CROPS.

Proclamation dated 14*th April* 1924 under Plant Protection Ordinance 16 of 1923 proclaiming Mosaic Disease to be within the meaning of that ordinance.

Regulations made by the Governor-in-Council dated 25*th April* 1924 stating that (1) the expression "owner" includes occupier and person in charge of any land and (2) owner to give notice in writing to Chief Inspector if he suspects existence of disease "Mosaic" and of the extent of the disease. (Made under section 22 of the *Antigua Plant Protection Ordinance* 16 *of* 1923).

COTTON.

Cotton Traffic Ordinance 5 *of* 1906. Regulates local traffic in cotton. No person to sell cotton (or purchase) without a license, purchaser to keep a purchase book.

The Cotton Protection Ordinance 7 *of* 1922. An Ordinance to provide for the protection of cotton.

The Cotton Protection Amendment Ordinance 5 *of* 1926 states that during the close season as declared the provisions of the principal Ordinance shall so far as they are applicable apply to such other plants in like manner as they apply to cotton plants.

The Cotton Protection Ordinance Regulates 1926 *dated March* 22, 1926 made under Cotton Protection Ordinance 7 of 1922 giving without notice and

all reasonable times during a close season to enter upon any land for the purpose of ascertaining whether any Okra plants are growing or remaining on such land during that season and may destroy all such plants found thereon.

Ordinance 8 *of* 1927 inserts in Cotton Protection Ordinance 7 of 1922 between Sections 4 and 5 the following:—4 (a) any occupier who shall at any time dispose of any cotton plants or any part thereof other than seed cotton whether the same be growing or remaining on any land occupied by him by any means other than by burning shall be guilty of an offence.

Ordinance 14 *of* 1929. The Cotton Protection Ordinance 1922 Amendment Ordinance 1929. Any person who intends to plant cotton upon any land of which he is the occupier the area and situation of such lands shall be notified to the Police Station in each district.

PROGRESS IN THE CHIEF INDUSTRIES.

SUGAR.

The year 1928 was on the whole a favourable one although the severe drought which lasted from December, 1927 until the end of February together with drought again in the months of April to September considerably reduced the 1928 crop and exerted a very unfavourable influence on the canes planted for reaping in 1929. The export of sugar (grey crystals) amounted to 18,906 tons valued at approximately £245,780. Little muscovado was produced during 1928, only one factory operating. The quantities of molasses and fancy syrup exported for the period in question were:—
period in question were:—

Vacuum Pan Molasses	529,800 gals.
Fancy Syrup	43,500 „

The Antigua Sugar Factory had a very successful year. The output of sugar (crop reaped in 1928) was 17,088 tons which sold at £14. 13. 1. per ton. The most striking feature of the factory's work during 1928 was the extraordinary high yield of sugar obtained from the canes viz., 13.10% or 7.63 tons of cane per ton of sugar against the average yield of 11% or 9.9 tons of cane per ton of sugar.

The output of sugar in Antigua is closely correlated with weather conditions. The following summary of the sugar exports for the period 1924-1928 exhibits considerable fluctuations attributable almost entirely to variations in rainfall during the growing season.

SUGAR EXPORTS 1924-1928.

	1924.	1925.	1926.	1927.	1928.
Sugar ..	7,081 tons.	16,530 tons.	11,466 tons.	22,269 tons.	18,906 tons.
Vacuum Pan Molasses ..	359,820 gals	128,000 gals.	382,836 gals.	715,377 gals.	529,800 gals.
Fancy Syrup	..	..	29,548 gals.	36,454 gals.	43,500 gals.

COTTON.

The acreage from which the 1928 crop was reaped amounted to 248 acres. The crop was badly attacked by the Pink boll worm and the return was small; only 17,700 lb. of lint cotton valued at £1,770 being exported. 45,850 lb. cotton seed valued at £110 was exported to other presidencies of the Leeward Islands.

During September 1928, there was a severe hurricane which destroyed most of the cotton planted for the 1929 crop so that replanting was necessary in September or October. The acreage finally planted was 245 acres. There was a remarkable freedom from pink boll worm and an excellent promise of a larger crop to be reaped in 1929.

PROGRESS IN THE MINOR INDUSTRIES.

LIMES.

The following lime products were exported during 1928.

Green Limes ..	49 brls.	valued at	£ 22
Raw lime juice ..	840 gals.	„ „	£ 42
Concentrated lime juice	2,350 gals.	„ „	£ 437
Lime Oil ..	108 „	„ „	£1,215

As a result of the decrease in the Dominica lime crops resulting from the attacks of wither tip and red root disease and of the very high prices now being obtained for lime oil considerable interest has been displayed in this industry and it seems probable that the area under limes will be increased considerably in the near future.

ONIONS.

The Onion crop was again a small one, only 1,650 lb. being exported.

COCONUTS.

Many of the coconut plantations suffered severely in the 1928 hurricane: this is all the more unfortunate as during 1926 and 1927 they had been slowly recovering from the effects of several dry seasons.

The young plants distributed free to peasants through the generosity of Mr. Macaulay (see page 21) are doing fairly well notwithstanding the long drought experienced.

The minor products exported include:—

Hides and Skins	to the	value	of	£297
Tamarinds	„ „	„	„	£611
Hardwood	„ „	„	„	£ 60
Turtle Shell	„ „	„	„	£ 93

With the initiation of the new steamship service between Canada and the West Indies, interest has been shown in the growing of vegetables for the Canadian winter market and two planters have cultivated trial plots of Tomatoes and Cucumbers under Government guarantees against loss. The produce is being shipped by the Government with a view to ascertaining the possibilities of developing the vegetable industry under Antigua conditions.

SPECIAL DUTIES PERFORMED BY THE AGRICULTURAL OFFICERS.

The various ornamental plots mentioned in the last report all received attention.

In addition gardens were established at the Citadel (Leper Home), the Hospital, and the Fiennes Institute (New Poor House).

THE ANTIGUA COTTON GROWERS' ASSOCIATION.

No change took place during the period under review in the Board of Management of the Association, and several meetings were held with the view of furthering the Cotton Industry.

During the year the Association decided to bear the cost of the erection of of a breeding cage for conducting experiments in ascertaining the time of the year the pink boll worm moth emerges. The cost of materials and labour of this cage amounted to $134.20.

The method adopted in the experiment is the growing of Cotton plants in suitable receptacles and at the time of the development of cotton flower buds of putting these plants into the cage in which a source of infection in the form of trays with infected cotton seed and cotton refuse, old bulbs were placed on a stand. Replicates of cotton plants were maintained to take the place of the first lot put into the cage as soon as the bolls of these plants had attained the size for examination for the pink boll worm. This work was abruptly terminated by the hurricane which passed this island on September 12.

It is intended to follow up the work in the next cotton growing season.

The financial work of the Association and the payment of bonuses were again carried out by the officers of the Association. As a result of the 1928 crop bonuses totalling £72 were paid to peasants on 11,527 lb. clean seed cotton.

The funds of the Association on March 31, 1929 showed a credit balance of $2,610.50. During the year advances were made to further the cotton industry in assisting small growers.

During the period under review the Asociation distributed 272 lb. of selected cotton seed to peasants for planting and a further supply of 4,723 lb. of cotton seed from estate fields for replanting.

The close season for the whole island was fixed from May-June 15. During this period no cotton or okra plants were allowed on the lands.

The yield of the crop was satisfactory in every way owing to a marked freedom from pink boll worm and cotton stainer infestation.

The leaf-eating Cotton worm *Alabama argillacea* was sporadic in its attacks and these were held in check by the usual dusting with Paris green and lime.

The total production of seed cotton for the period under review amounted to 50,444 lb. and an average ginning percentage of 31 was obtained by the factory. The yield of clean lint was 14,109 lb.

During the year the Association lost a most valuable member through the death of Mr. J. J. Roden.

DETAILS OF ADMINISTRATION.

The expenditure and receipts for the period under review are as follows:—

Year.	Expenditure.	Receipts.
1928-29	£877. 14. 6.	£198. 1. 2.

LAND SETTLEMENT AND CROWN LANDS.

Considerable attention was again paid to work in connection with the land settlement schemes at Sawcolts, Clare Hall and Wallings. During the period 1928-29 the following sums of money were received as instalments from these three districts.

Sawcolts	£ 31	17	4
Wallings	£ 30	14	1
Clare Hall	£140	13	4
	£203	4	9

There are 89 allotments at Sawcolts of which number forty have been paid for in full.

There are 122 allotments at Clare Hall six of which have been paid for in full.

At Wallings there are 18 allotments. This is the most recently established settlement and none of the allotments have so far been fully paid for.

At Piccadily 109 tenants rent in all 101 acres. At Skerretts 11 tenants rent 12 acres and at Body Ponds 48 tenants rent in all 41 acres. The sums collected from these districts during the period under review are:—

Piccadlly	£54	4	5
Skerretts	£24	10	1
Body Ponds	£22	0	11

EXHIBITIONS.

No Agricultural Show was held in 1929.

CORRESPONDENCE.

The number of letters dealt with during the period under report was 531. In addition numerous minute papers were dealt with.

OFFICIAL VISITS.

His Excellency Sir Eustace Fiennes, Bart. Governor and Commander-in-Chief of the Leeward Islands visited the Botanic Station on several occasions.

The Superintendent of Agriculture visited the Botanic and Experiment Stations on several occasions.

Professor H. A. Ballou, O.N., M.Sc., also visited the Station and other Experiment Stations and plots.

Professor F. S. Ashby visited the Stations in connection with Gumming Disease of Sugar Cane.

METEOROLOGICAL SUMMARY, 1928.
KEPT AT THE BOTANIC STATION, ANTIGUA.

Month.	Dry.		Thermometer. Wet.		Relative Humidity.		Maximum.	Minimum.	Barometer Reading.		Rainfall. Botanic Stations.	Barometer Corrected.		Thermometer.	
	9 A.M.	3 P.M.	9 A.M.	9 A.M.	3 P.M.	3 P.M.			9 A.M.	3 P.M.		Highest.	Lowest.	Highest Max.	Lowest Min.
January ..	78.9	80.4	72.7	73.2	70.4	67.2	82.0	61.0	30.045	29.946	0.65	30.101	29.923	84	66
February ..	80.1	80.4	72.0	72.3	68.5	64.3	81.7	70.1	30.123	30.047	2.47	30.146	30.012	83	67
March ..	80.2	80.1	73.0	72.0	70.2	65.2	83.8	71.6	30.062	29.986	3.50	30.129	29.934	85	64
April ..	81.2	83.3	74.6	76.1	72.1	68.0	84.2	72.4	30.046	29.983	1.16	30.108	29.878	87	68
May ..	81.9	84.3	75.2	75.9	68.4	62.3	86.2	72.4	30.024	29.987	0.88	30.093	29.925	91	69
June ..	84.4	85.4	77.8	78 0	69.2	66.1	87.6	75.2	30.034	29.973	0.76	30.086	29.919	90	72
July ..	84.4	85 4	77.0	78.3	68.6	66.4	88.0	74.1	30.052	29 990	2.60	30.098	29.846	90	68
August ..	84.8	84.9	78.9	78.3	72.3	69.0	89.0	75.9	30.001	29 950	4.25	30.065	29.917	93	72
September ..	85.3	85.6	79.9	80.2	76.0	76.3	88.8	77.1	29.962	29.875	9.48	30.055	29.428	91	74
October ..	* ..	..	..	..	..	..	..	..	29.960	29.885	3.12	30.061	29.783	..	* ..
November ..	..	..	..	..	..	..	..	..	29.959	29.878	4.23	30.022	29.816	..	..
December ..	..	..	..	..	..	..	..	..	29.988	29.912	5.75	30.059	29.800	..	..
											38.85				
Means for the Year ..	82.4	83.3	75.7	76.0	76.0	69.2	85.7	72.2	30.022	29.951					

Highest Maximum Temperature = 93° on 16 August, 1928.
Lowest Minimum Temperature = 64° on 10 March, 1928.
Highest Barometer (corr.) 30.146 on 25 February, 1928.
Lowest Barometer (corr.) 29.438 on 12 September, 1928.
Greatest Rainfall in 24 hours 7.31 ins. on 13 September, 1928.
Earthquakes recorded = 3 on 23, 25 September and 4 October respectively.
Severe hurricane on 12 September, 1928, a fair amount of damage was done locally.
* Thermometer broken during hurricane of September 12, 1928.

Government Laboratory for the Leeward Islands,
18th February, 1929.

A. E. COLLENS, F.I.C., F.C.S.
Government Chemist and Superintendent of Agriculture.

AVERAGE RAINFALL, 1874—1928.

In 1874	the	average	rainfall	on	41	stations	was 31.16
1875	„	„	„	„	40	„	„ 28.78
1876	„	„	„	„	36	„	„ 41.89
1877	„	„	„	„	38	„	„ 49.05
1878	„	„	„	„	53	„	„ 47.11
1879	„	„	„	„	52	„	„ 61.54
1880	„	„	„	„	46	„	„ 49.68
1881	„	„	„	„	44	„	„ 53.75
1882	„	„	„	„	45	„	„ 33.04
1883	„	„	„	„	56	„	„ 55.51
1884	„	„	„	„	56	„	„ 43.98
1885	„	„	„	„	53	„	„ 43.39
1886	„	„	„	„	55	„	„ 47.78
1887	„	„	„	„	50	„	„ 43.68
1888	„	„	„	„	47	„	„ 44.23
1889	„	„	„	„	56	„	„ 73.59
1890	„	„	„	„	45	„	„ 33.00
1891	„	„	„	„	45	„	„ 50.01
1892	„	„	„	„	53	„	„ 38.43
1893	„	„	„	„	54	„	„ 38.69
1894	„	„	„	„	68	„	„ 38.85
1895	„	„	„	„	69	„	„ 52.91
1896	„	„	„	„	56	„	„ 59.85
1897	„	„	„	„	54	„	„ 39.67
1898	„	„	„	„	66	„	„ 48.85
1899	„	„	„	„	63	„	„ 47.59
1900	„	„	„	„	64	„	„ 36.95
1901	„	„	„	„	65	„	„ 57.61
1902	„	„	„	„	71	„	„ 58.80
1903	„	„	„	„	68	„	„ 43.68
1904	„	„	„	„	70	„	„ 37.01
1905	„	„	„	„	68	„	„ 31.40
1906	„	„	„	„	66	„	„ 53.93
1907	„	„	„	„	70	„	„ 43.45
1908	„	„	„	„	72	„	„ 43.79
1909	„	„	„	„	70	„	„ 45.15
1910	„	„	„	„	70	„	„ 34.77
1911	„	„	„	„	72	„	„ 36.47
1912	„	„	„	„	72	„	„ 32.20
1913	„	„	„	„	73	„	„ 42.76
1914	„	„	„	„	72	„	„ 36.86
1915	„	„	„	„	75	„	„ 56.14
1916	„	„	„	„	74	„	„ 58.23
1917	„	„	„	„	70	„	„ 36.62
1918	„	„	„	„	70	„	„ 37.87
1919	„	„	„	„	70	„	„ 49.56
1920	„	„	„	„	70	„	„ 30.09
1921	„	„	„	„	74	„	„ 30.32
1922	„	„	„	„	70	„	„ 35.14
1923	„	„	„	„	68	„	„ 32.41
1924	„	„	„	„	67	„	„ 41.57
1925	„	„	„	„	68	„	„ 30.75
1926	„	„	„	„	70	„	„ 50.20
1927	„	„	„	„	67	„	„ 45.84
1928	„	„	„	„	63	„	„ 33.24

AVERAGE MONTHLY RAINFALL, 1928.

January ..	1.82
February ..	1.87
March ..	3.20
April ..	0.55
May ..	0.76
June ..	0.98
July ..	2.20
August ..	3.03
September ..	5.51
October ..	3.63
November ..	4.52
December ..	5.17
	33.24

The average rainfall for 55 years is 43.61 inches, so that the rainfall for the year 1928 is 10.37 inches below the average.

A. E. COLLENS, F.I.C., F.C.S.
Govt. Chemist and Superintendent
of Agriculture
for the Leeward Islands.

Government Laboratory,
Leeward Islands,
18.2.29.

RETURN OF RAINFALL ON THE FOLLOWING PLACES IN ANTIGUA FROM 1ST JANUARY, TO 31ST DECEMBER, 1928.

NAME.	No.	JAN.	FEB.	MAR.	APL.	MAY.	JUNE.	JULY.	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL.
Doigs	1	3·15	1·91	4·60	1·12	2·04	2·40	2·41	1·00	13·44	5·59	5·77	10·12	54·55
Body Ponds	2	2·42	3·02	6·51	0·97	1·34	2·57	2·81	4·20	6·98	5·66	4·93	6·82	48·23
Carlisles	3	3·18	2·82	4·78	1·10	0·86	1·13	4·18	3·47	5·98	4·83	5·22	5·96	43·51
Vernons	4	1·15	2·58	3·91	0·60	0·41	1·03	2·11	3·15	5·23	5·27	9·08	6·51	41·03
St. Philips Rectory ...	5	2·96	2·46	3·71	1·21	1·95	1·70	2·68	3·73	*6·17	3·58	4·36	6·42	40·93
Yorks	6	1·71	1·77	3·76	0·52	0·55	0·79	1·86	5·15	7·91	5·75	5·56	5·26	40.59
Bendals	7	2·11	1·92	3·84	0·70	0·87	1·27	2·52	3·97	6·14	5·93	5·90	5·44	40·58
Jolly Hill	8	2·02	2·07	3·75	0·80	0·89	1·70	1.70	7·27	6·13	5·48	4·20	4·50	40·51
Wallings (Hill) ...	9	4·01	2·07	3·06	1·17	0·22	1·42	2·94	3·85	*7·30	4·32	4·49	4·22	39·07
Wallings (Dam) ...	10	4·00	2·12	3·05	0·90	0·24	1·32	2·94	3·93	*7·31	4·30	4·66	4·15	38·92
Botanic Station ...	11	0·65	2·47	3·50	1·16	0·88	0·76	2·60	4·25	9·48	3·12	4·23	5·75	38·85
Lyons	12	2·16	2·51	3·31	0·53	1·58	1·76	2.97	3·57	6·20	2·79	4·33	6·90	38·61
Millars	13	2·96	2·70	3·94	1·04	0·84	1·10	4·01	3·20	5·45	4·20	4·16	4·80	38·43
Greencastle	14	1·62	1·78	3·19	0·87	0·97	0·77	1·96	4·40	9·08	4·36	4·00	5·26	38·26
Big Duers	15	2·06	2·46	2·98	0·95	1·51	1·06	2·46	2·78	*8·26	3·44	4·34	5·53	37·83
Willis Freemans ...	16	2·29	1·67	4·10	1·33	0·72	2·27	2·31	3·40	5·16	3·87	3·84	6·34	37·30
Sandersons	17	2·03	1·68	3·30	0·32	1·49	0·90	2·03	2·78	6·09	4·22	5·57	6·51	36·92
Blakes	18	1·47	2·16	3·68	0·80	1·01	1·93	2·55	3·56	4·21	3·61	4·87	6·67	36·52
Friars Hill	19	2·58	2·25	3·41	1·16	0·62	1·20	2·05	2·44	7·13	2·95	3·97	5·91	35·67
Burkes	20	1·56	1·54	3·91	0·74	0·33	1·18	2·10	2·35	8·58	4·06	3·83	5·22	35·40
High Point	21	2·14	2·93	3·07	0·38	0·43	0·74	1·59	2·12	7·38	3·23	5·12	5·16	34·74
Weatherills	22	1·63	1·86	2·70	0·69	0·99	0·76	1·80	2·80	6·24	4·39	4·92	5·92	34·70
Crosbies	23	2·10	2·27	3·26	0·16	1·06	0·90	2.24	2·56	4·92	4·33	4·32	6·18	34·30
Cooks	24	0·80	1·24	2·14	0·60	0·35	0·57	1·83	5·90	7·00	4·10	5·10	4·70	34·23
Gilberts	25	1·73	1·87	3·69	0·57	9·81	0·88	2·05	2·73	5·27	3·33	6·23	4·18	33·97
Marble Hill	26	1·18	1·76	2·68	0·56	0·41	0·67	1·68	4·08	6·00	4·39	4·93	5·29	33·63
Creekside	27	1·65	1·68	3·55	0·80	0·95	1·34	2·61	4·17	5·84	3·10	2·50	5·33	33·52
Morris Loobys ...	28	1·94	0·56	4·31	0·54	0·60	0·70	1·87	3·03	4·78	3·35	4·81	6·44	32·93
The Diamond ...	29	1·68	1·83	3·70	0·93	1·17	0·75	2·24	2·35	4·31	3·73	5·66	4·47	32·82
Pares	30	1·15	1·61	3·54	0·57	0·51	0·30	1·61	3·12	6·60	3·18	6·17	4·34	32·70
Judges ...	31	1·98	2·06	2·98	0·68	0·66	0·60	1·58	2·06	6·22	3·92	4·02	5.94	32·70
Delaps	32	2·15	1·39	2·93	1·98	0·23	1·10	1·18	3·61	3·57	3·17	4·52	6·86	32·69

* Rain gauge blown away during hurricane amount recorded is estimated.

RETURN OF RAINFALL ON THE FOLLOWING PLACES IN ANTIGUA FROM 1ST JANUARY, TO 31ST DECEMBER, 1928.—*(continued.)*

NAME.	NO.	JAN.	FEB.	MAR.	APL.	MAY.	JUNE.	JULY.	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL.
Parham New Work ...	33	1·12	1·64	3·42	0·54	0·69	0·83	1·89	2·84	5·16	3·76	6·26	4·46	32·61
Collins	34	1·34	1·44	3·51	0·44	1·26	0·75	1·70	2·56	7·08	2·20	4·96	4·87	32·11
Long Lane	35	1·97	2·00	2·80	0·76	1·26	0·91	2·12	3·09	5·12	2·67	4·76	4·59	32·05
Belle Vue	36	1·94	2·15	3·88	0·66	0·48	0·85	1·64	2·45	5·19	3·19	5·00	4·72	32·01
The Point	37	1·74	2·23	1·88	0·53	0·54	0·43	2·20	3·78	7·41	3·31	3·07	4·68	31·80
Antigua Sugar Factory	38	1·56	2·36	2·86	0·85	0·27	0·51	2·05	3·06	5·65	3·11	3·95	5·11	31.34
Yeptons	39	1·34	1·73	3·19	0·78	0·33	0·56	1·96	3·48	4·96	4·83	3·64	4·93	31·08
Ffryes	40	1·68	1·89	2·52	0·29	1·41	2·03	1·77	3·11	5·23	2·21	3·17	5·63	30·80
Gaynors	41	1·52	1·74	3·17	0·36	1·18	0·60	1·68	2·33	*5·95	2·81	4·47	4·95	30·79
Donovans	42	1·68	2·54	3·08	0·49	0·73	0·35	2·11	3·19	3·57	3·12	4·92	4·89	30·67
The Wood	43	2·28	2·08	2·93	1·05	0·18	1·21	2·24	2·71	5·55	2·39	2·89	4·80	30·31
Potters	44	1·63	1·95	2·90	0·70	0·59	0·50	2.19	2·15	6·46	3·80	4·56	2·80	30·23
Langfords	45	1·71	1·87	2·18	0·85	0·86	0·61	1·95	2·89	3·95	4·17	4·12	4·97	30·13
Union	46	2·15	2·05	2·62	0·45	0·50	0·38	2·62	1·12	6·38	3·38	3·50	4·41	29·56
Cedar Valley	47	2·21	1·94	2·93	0·99	0·32	1·43	1·75	1·73	4·28	3·39	3·78	4·69	29·44
Ottos	48	1·71	1·59	2·67	0·57	0·74	0·63	2·40	3·16	3·81	2·32	3·73	5.50	28·83
Parham Old Work ...	49	0·98	1·95	2·79	0·65	0·57	0·69	1·44	2·77	4·66	3·79	4·46	3·59	28·34
Cades Bay	50	0·80	0·42	2·00	0·50	0·20	1·54	2·25	3·00	2·45	4·80	4·10	6·20	28·26
Fitches Creek ...	51	2·12	1·87	2·80	0·89	0·44	0·50	2·20	2·48	4·25	2·58	3·55	4·61	28·10
Thibou Jarvis ...	52	2·24	1·58	3·01	0·46	0·64	0·59	1·60	2·60	2·62	3·70	4·18	4·52	27·74
Cochranes	53	0·80	0·11	3·40	0·56	0·86	1·10	1·93	2·99	2·03	3·64	4·25	6·01	27·68
Parham Lodge ...	54	1·06	2·26	2·89	0·39	0·82	0·37	1·92	2·04	4·30	2·84	5·11	3·06	27·66
Mercers Creek ...	55	1·12	1·06	2·83	0·38	0·53	0·51	1.15	2·15	6·50	2·50	4·80	4·06	27·59
Weirs	56	2·80	2·06	2·69	0·70	0·50	0·68	1·68	3·13	4·36	2·18	3·95	2·33	27·06
Coconut Hall ...	57	0·95	1·56	2·76	0·00	0·68	0·39	1·91	2·04	4·32	3·01	4·48	3·71	25·84
Comfort Hall ...	58	1·80	0·90	2·20	0·50	1·00	0·45	1·18	1·76	3·16	2·38	5·61	4·67	25·61
Mayers	59	1·15	1·86	3·31	0·30	1·00	0·60	1·33	1·61	2·58	2·91	3·50	3·00	25·55
Blackmans	60	1·53	1·74	2·91	0·67	0·41	0·30	1·51	2·68	3·34	2·01	3·72	4·66	25·48
Cedar Hill	61	0·80	0·42	2·00	0·50	0·20	1·54	2·25	3·00	2·45	4·80	4·10	6·20	25·37
Cassada Garden ...	62	1·42	1·81	2·72	0·70	0·27	0·57	1·70	1·57	3·70	2·35	2·99	3·32	23·12
Hill House	63	1·25	2·14	1·82	0·00	0·49	1·83	1·48	2·27	†0·53	3·26	2·77	4·58	22·42
Codrington Village Barbuda ..		1·55	1·98	2·16	1·39	0·99	1·10	1·00	3·59	3·42	3·51	2·74	2·43	25·36

† Stand for raingauge blown away during hurricane and funnel also.

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